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FIGURE 2 - SA2 LOCATION MAP

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Rev. 07/10/02

Public Health Assessment

Sauget Area 2 Landfill

Sites P, Q and R

Sauget, St. Clair County, Illinois

EPA Facility ID # ILD000672329

February 5, 2003

Comment Period Ends April 11, 2003

Prepared by

Illinois Department of Public Health
under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

Summary

Sauget Area 2 is a proposed National Priorities List site. This public health assessment prepared by the Illinois Department of Public Health (IDPH) evaluates Area 2 Sites P, Q and R. A separate public health assessment evaluated Sauget Area 2 Sites O and S.

The source of contamination at these sites included industrial subsurface waste disposal at Site P, Q, and R from nearby industries. Contaminants at these sites include polychlorinated biphenyls (PCBs), nitrobenzenes, chlorinated solvent wastes, pesticides, polycyclic aromatic hydrocarbons, and metals.

The sites consist of mostly inactive landfills with commercial and industrial areas in the northern section of Site Q and southern portion of Site P. The southern portion of Site Q is not fenced, and has evidence of trespassing.

Exposure dose estimates for workers in the northern portion of Site Q suggest possible adverse health effects from exposure to PCBs in the soil. Children who regularly eat channel catfish caught in the Mississippi River along Site R may be at risk of adverse health effects from exposure to 2-2 methyl-4-chlorophenoxy proprionic acid (MCPP).

IDPH concludes that the northern section of Site Q and the channel catfish in the Mississippi River along Site R pose a public health hazard. IDPH further concludes that subsurface contaminants and groundwater at Sites P, Q, and R and the surface soil at Sites P and R and the southern section of Site Q pose no apparent public health hazard.

IDPH recommends that workers at sites P, Q, and R avoid contacting, disturbing, or moving contaminated surface soil or waste; children's consumption of channel catfish from the Mississippi River along Sauget Area 2 be limited to twelve fish meals per year; and PCB exposure to workers on Site Q be reevaluated when additional data become available.

Purpose and Health Issues

The Sauget Area 2 site was proposed for addition to the National Priorities List on September 13, 2001. Area 2 consists of Site O, and landfills P, Q, R, and S. In this public health assessment, the Illinois Department of Public Health (IDPH) examined whether exposure to contaminants at Sites P, Q and R has occurred in the past, is occurring, or may occur in the future. Site O and Landfill S are addressed in a separate public health assessment.

Site P is in a mixed industrial and commercial area, with the nearest homes 0.3 miles east across a four-lane highway. Site R is fenced and is covered by a clay cap. Employees of the businesses in the northern section of Site Q are currently most likely to be exposed to site-related contaminants. Past and future exposures may occur in workers sampling or monitoring the sites and excavating or otherwise disturbing the contaminated areas.

Background

Location and History

Sauget is in St. Clair County, Illinois south of East St. Louis and across the Mississippi River from St. Louis, Missouri. Sauget is surrounded by several large industries and has many areas of contamination. These contaminated areas are collectively known as the Sauget Sites and include areas in the communities of Sauget and Cahokia, Illinois (Figure 1). The Sauget Sites are divided into two areas, Area 1 and Area 2. The dividing line for Areas 1 and 2 is Illinois Route 3, with the sites east of Route 3 belonging to Area 1 and those to the west in Area 2. This public health assessment evaluates Sites P, Q and R in Area 2 (Figure 2).

Site P

Site P covers approximately 20 acres in the northwestern part of Sauget. The site is an inactive landfill permitted by the Illinois Environmental Protection Agency (Illinois EPA). Site P has steep slopes along the sides of the landfill, which are somewhat eroded. Access to the site is not restricted and a nightclub is located on top of its southern end. Surface runoff from the site is toward the low area in the south-central portion of the site. This low area is the result of a water line that crosses the property (1). The site is bordered to the west by the Illinois Gulf Railroad, to the east by the Terminal Railroad Association, and to the south by Monsanto Avenue. Surface drainage does not leave the site due to the railroad embankments and the depression in the central portion of the site (1).

Site Q

Site Q is an inactive waste disposal facility in Sauget and Cahokia that covers approximately 90 acres. Sauget and Company operated the facility between 1966 and 1973 (1). The site is on the east bank of the Mississippi River and is on the river side of the flood control levee. The site was flooded in 1973 and 1993 (2,3).

Much of Site Q is occupied by the Pillsbury Company, which operates a coal and grain unloading and transfer facility. The River City Landscape Supply, a company that reclaims re-bar from building materials, occupies ten acres of Site Q along the Mississippi River. Three barge terminals are along the river at Site Q. A railroad spur divides the site into northern and southern sections. A chainlink fence in the north and a 24-hour guard at the gate restrict vehicular traffic. Pedestrian access is not restricted in the southern portion of the site.

Site Q was operated as a landfill without an Illinois EPA permit. The north site was registered with IDPH in 1967, before the formation of Illinois EPA (1). The site is presently covered with black cinders, which makes it highly permeable.

In early 1972, a smoldering underground fire was observed at the site, which continued until October 1972. During flooding in 1973, exposed refuse was observed being carried downstream (1). Beginning in 1972, Sauget and Company applied several times for a permit to extend the landfill in the southern portion of Site Q. Illinois EPA denied these extension permits, but disposal reportedly continued in this area (1).

In 1993, Mississippi River flooding inundated all of Site Q for several months, and left drums exposed in various portions of the site. In May 1994, the U.S. Environmental Protection Agency (USEPA) Technical Assistance Team contractor Ecology and Environment (E & E) collected three drum samples from Site Q. These samples were collected after exposed drums were noted in the embankment of the Mississippi River because of scouring that took place during the flood of 1993. In November 1994, Illinois EPA and IDPH collected surface soil samples from Site Q, including two drum samples. In 1995, USEPA removed surface waste materials including exposed drums along the shoreline of the Mississippi River and repaired the exposed sections of the fill area.

On October 18, 1999, USEPA began removing wastes including drums from the southern portion of Site Q. The removal involved approximately 25 acres in a low area where water ponded and persons fished. This removal was prompted by PCB-contaminated surface wastes and soils and the presence of exposed drums. Removal included 3,271 drums and about 17,000 tons of waste, and was completed in April 2000 (5). Cleanup funds were limited, so the southern portion of the site still contains contaminated areas and drums protruding from the ground (5).

Site R

Site R is the location of the Sauget Toxic Dump (which is also known as the Krummerich Landfill). The site is owned by Monsanto Chemical Company and was used as a landfill by Monsanto from 1957 to 1977. Site R is north and west of Site Q on the river side of the flood control levee (Figure 2). Site R is covered with a clay cap and is vegetated. Closure of Site R was completed in October 1979. Drainage flows to ditches along the perimeter of the site. Access to Site R is restricted by a chainlink fence and monitored by television cameras. An estimated 262,500 tons of liquid and solid industrial waste was disposed of at Site R. In 1968 and 1972, Monsanto submitted two reports to Illinois EPA concerning the waste disposed at Site R. Site R was flooded by the Mississippi River in 1973 and 1993.

Demographics and Land Use

Most of Sauget Area 2 is either landfill or industrial property. Agricultural land is also present in the eastern portion of Area 2 and to the south of Area 2 along Cargill Road. Commercial property including a nightclub are south and east of Site P. Industries in Area 2 include the American Bottoms Regional Waste Water Treatment, the Sauget Waste Water Treatment Plant, Trade Waste Incinerator, and Phillips Petroleum Company. The number of employees that work in businesses in Area 2 is estimated to be 150. Nearby industries also include Cerro Copper, Big River Zinc, and Solutia.

No permanent residents live within Sauget Area 2 (3). The nearest home is about 0.3 miles east of the Site P, across Route 3 in East St. Louis, Illinois. The home nearest Site Q is 0.75 miles east across Route 3 (Sauget) and southeast (Cahokia). The home nearest Site R is approximately 0.8 miles east, across Route 3 in Sauget, Illinois. The population within 1 mile of Area 2 is about 9,000, including 711 children less than 5 years of age and 2,185 between 5 - 17 years of age (3).

Environmental Sampling at Site P

Environmental sampling at Site P consisted of four subsurface soil samples collected by Ecology and Environment, Inc. (E and E) in February 1987 and four surface samples collected by Illinois EPA and IDPH in March 1994 (see Figure 3). Chemicals analyzed in these samples included volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), inorganic chemicals, pesticides, and polychlorinated biphenyls (PCBs).

Environmental Sampling at Site Q

Illinois EPA collected several samples from Site Q in the 1970s including leachate, ponded surface water, and groundwater. These samples were analyzed only for inorganic chemicals and a few organic chemicals.

Illinois EPA collected two samples from leachate seeps in October 1981 and three more leachate samples in September 1983. These samples were analyzed for inorganic chemicals and a few organic chemicals, including phenols and PCBs (Figure 4).

In July 1983, USEPA had E & E investigate the northern portion of Site Q in response to the drums uncovered in this area in 1980. This study involved a geophysical investigation and subsurface soil sampling (Figure 4). The subsurface sampling consisted of 35 samples collected from 18 locations. The depths of the samples ranged from 10 to 26 feet (1). The sample analysis included 112 organic chemicals including 2,3,7,8-TCDD (1).

In 1987, E & E collected groundwater samples from eight locations. These samples were analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, and PCBs.

On July 21 and 22, 1987, E & E collected six air samples (Figure 5). A blank sample was collected for each of the two days. The wind on July 21 was generally from the south-southwest and south, while on July 22 it was predominantly from the southeast. The samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Based on the wind direction at the time of sampling, the airborne contaminants from Site R would not be represented in these samples.

In March 1994, Illinois EPA collected eight surface soil samples and two drum samples (4). In May 1994, E & E collected 3 drum samples at Site Q (5).

In 1994, Geraghty and Miller conducted an expanded remedial investigation on the northern section of Site Q (6). This investigation included a magnetometer survey (to identify buried drums), a soil gas survey, subsurface soil samples, groundwater samples, and ambient air monitoring. Sixty soil gas samples and eleven subsurface soil samples were collected as part of the expanded investigation. Ten air samples were collected on three consecutive days in July 1994. The air samples consisted of four samples upwind and six samples downwind of the northern section of Site Q. Seven groundwater wells were sampled during the investigation.

On October 18, 1999, USEPA began removing wastes and drums from the southern portion of Site Q (7). The removal was prompted by PCB-contaminated surface wastes and soils. Waste, drummed material, surface soil, subsurface soil, and groundwater samples were collected as part of the removal action. Six of the surface soil samples were collected in the southern ponded area of Site Q and fourteen surface soil samples were collected on railroad property (presumably not landfilled) where a road was placed to get the waste from the removal area to the railroad tracks for loading. The fourteen railroad samples were collected to see if the transfer of site wastes contaminated the surface soil in this area. Seven samples were collected before the waste was transferred and seven were collected after the operation was complete (Figure 4).

The collection of additional environmental samples at Site Q including air, groundwater, waste, and surface soil began in June 2002 and continued into fall 2002 (8).

Environmental Sampling at Site R

In August 1968, IDPH collected five groundwater samples at Site R. Analysis of these samples was limited to alkalinity, total solids, and phenol. Illinois EPA collected another set of samples from these wells in December 1972. These samples were analyzed for inorganic chemicals, phenols, and oil. In January 1973, Illinois EPA collected samples from three waste ponds and analyzed these for phenol. Illinois EPA sampled the monitoring wells and an industrial well located northwest of the site annually between 1973 and 1976. All well samples collected before 1976 were analyzed for inorganic chemicals and phenols. The 1976 well samples were analyzed for PCBs in addition to inorganic chemicals and phenols.

In 1977, D'Appolonia Consulting Engineers installed eight monitoring wells during a subsurface investigation of the site. In 1979, Illinois EPA sampled these eight wells and analyzed the samples for inorganic and organic chemicals reportedly disposed of in the landfill. In March 1981, Illinois EPA again sampled the wells and analyzed the samples for organic chemicals.

In October 1981, Illinois EPA collected leachate and sediment samples on the side of the landfill next to the Mississippi River. These samples were collected from leachate seeps that were flowing into the river.

In November 1981, a USEPA contractor collected leachate and sediment samples from three seeps along the Mississippi River. Eight samples were collected, which consisted of three leachate samples, two duplicate leachate samples and three sediment samples (Figure 6). These samples were analyzed for dibenzodioxins and dibenzofurans, inorganic chemicals, and organic chemicals.

In 1987, E & E collected seven groundwater samples including one duplicate from six locations. These samples were analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, and PCBs.

A Remedial Investigation (RI) was conducted at Site R beginning in 1992 (9). Environmental samples for the RI included soil gas, ambient air, surface soil, sediment, subsurface soil (25 from 8 locations in 1989 and 48 from 16 locations in 1992), and groundwater from 22 wells. Approximately 280 soil gas samples from 90 locations were collected in 1999 before the RI. The soil gas samples were analyzed for VOCs. Nine ambient air samples were collected in July 1992 and consisted of two downwind samples and one upwind sample for three consecutive days. Ambient air samples were analyzed for VOCs, SVOCs, and metals. Eighteen surface soil samples were collected in 1989, 8 from the clay cap and 10 from the perimeter. Eight sediment samples were collected from the storm water trenches around the perimeter of the site. Sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Seventy-three subsurface samples were collected or used in the RI. These sediment samples consisted of 25 samples from 8 locations in 1989 and 48 samples from 16 locations in 1992. Subsurface samples

were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Groundwater from 22 wells was analyzed for inorganic chemicals, VOCs, SVOCs, pesticides, PCBs, and metals.

In October and November 2000, surface water, sediment, and fish samples were collected in the Mississippi River upstream and downstream of Sites R and Q (8). Samples were collected next to Site R (Figure 6) and upstream and downstream of Site R. The fish samples collected included whole catfish and big mouth buffalo fish fillets. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, dioxins, furans, and metals.

The collection of additional environmental samples at Site R including air, groundwater, waste, and surface soil, began in June 2002 and will continue through the fall of 2002 (10).

Site Visit

IDPH has made several site visits; the most recent was on April 30, 2002. During the flood of 1993, IDPH observed the condition of the site. IDPH staff visited Site Q during drum removal in the fall of 1999. Evidence of trespass, including spent shotgun shells and motorcycle and all-terrain-vehicle tracks, was noted during on site visits to Site Q. Persons have been seen fishing at the ponds at the south end of Site Q and the Mississippi River bank on site Q. After the flood of 1993, drums were exposed on the bank of the Mississippi River at Site Q and in the central portion of Site Q.

Discussion

Chemicals of Interest

IDPH compared the results of each air, soil, sediment, fish, leachate, surface water, and groundwater sample with appropriate screening comparison values used to select chemicals for further evaluation for carcinogenic and non-carcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation. The chemicals of interest are shown in Tables 1 through 7. A brief explanation of the comparison values used is found in Attachment 1.

Surface Soil

Surface soil samples were collected from the top 6 inches. The chemicals of interest in surface soil from Sites P, Q, and R include PCBs, lead, cadmium, arsenic, benzene, polycyclic aromatic hydrocarbons (PAHs), and pesticides (Table 1). The surface soil samples at Site R were from the clay cap and along the perimeter. The surface soils in the ponded area of Site Q have been removed by USEPA.

Subsurface Soil

Subsurface samples were collected from Sites P, Q and R. Forty-one chemicals of interest were identified in subsurface soil samples (Table 2). Many subsurface soil samples were from well boring cores that were through the waste materials at the landfills.

Drums and Waste

Drums have been exposed in several locations at Site Q due to flooding. Drums sampled from the southern portion of Site Q were mostly unexposed drums uncovered during the USEPA 2000-2001 removal activity (5). USEPA also sampled waste piles during the removal activity. All the drums and waste tested were ultimately removed (4). Forty-three chemicals of interest were identified in the drums and waste (Table 3).

Sediments

Sediments were collected from drainage areas around Site R, including the soil under seeps flowing from Site R to the Mississippi River. In addition, an ecological risk assessment conducted by Menzie-Cura included Mississippi River sediments upstream, along Site R, and downstream of Site R. Using the comparison values for soil, IDPH identified sixteen chemicals of interest in the sediment samples (Table 4).

Groundwater

Seventy-two chemicals of interest were identified in the groundwater under Sites Q and R (Table 5). IDPH used drinking water comparison values to select chemicals of interest for groundwater.

Surface Water

Nine chemicals of interest were identified in the Mississippi River (Table 6) including chlorinated VOCs and SVOCs. No PCBs were detected in the surface water. IDPH used drinking water comparison values for the surface water samples.

Leachate

The leachate samples were collected from the west side of Site R before they enter the Mississippi River. Sixteen chemicals of interest were found in the leachate samples including PCBs, chloroaniline, chlorobenzene, chlorophenol, nitroaniline, nitrophenol, and 2,4-D (Table 6).

Fish

Fish sampled included whole channel catfish and big mouth buffalo fish. 2-2 Methyl-4-chlorophenoxy proprionic acid (MCPP) was the only chemical that exceeded an oral health guideline (Table 7).

Air

Twenty-one chemicals of interest, including PCBs, chlorinated solvents, and metals, were identified from air sampling results at Sites Q and R (Table 8).

Exposure Analysis

Exposure to a chemical at a level that exceeds a comparison value does not necessarily mean that adverse health effects will result. The potential for exposed persons to experience adverse health effects depends on:

- how much of each chemical a person is exposed to,
- how long a person is exposed, and
- the health condition of the exposed person.

A chemical can affect people only if they contact it through an exposure pathway at a sufficient concentration to cause a toxic effect. This requires a source of exposure, an environmental transport medium, a point of exposure, a route of exposure, and a receptor population. A pathway is complete if all components are present and if people were exposed in the past, are currently exposed, or will be exposed in the future. If parts of a pathway are absent, data are insufficient to decide whether it is complete, or exposure may occur at some time (past, present, future), then it is a potential pathway. If part of a pathway is not present and will never exist, the pathway is incomplete and can be eliminated from further consideration.

Completed Exposure Pathways

Completed exposure pathways (Table 9) exist for contaminants in surface soil at Sites P and Q, air at Sites Q and R, surface water, and fish in the Mississippi River. Exposure can occur by breathing contaminated air, coming into direct contact with the soil, water, or waste, ingesting the chemicals, or absorbing them through the skin.

Air

Exposure to airborne chemicals would occur for workers at Site Q, including workers at the barge terminals and the landscape supply company. Exposure was estimated for adult workers working an 8-hour work day. The maximum levels of chemicals in the workers' ambient air are much less than the U.S. Department of Labor Occupational Health and Safety Administration permissible exposure limits for these chemicals. No adverse health effects would be expected from worker exposure to airborne contaminants.

Fish

IDPH estimated the exposure of children eating fish caught near the site. Using the maximum levels of chemicals found in fish, we assumed that a 16-kilogram child ate 16 grams of fish per

day for half the year. Calculations were done for buffalo fish fillets and whole catfish. The levels of chemicals in whole catfish were reduced by 50% to adjust for their loss during cleaning and cooking the fish.

Based on the exposure scenarios, MCPP in catfish caught near Site R may increase the risk of non-cancer adverse health effects if consumed over a long period. Available data suggest a low potential of MCPP to bioaccumulate in fish (11). The source of MCPP in channel catfish is not known. No increased risk of cancer is expected from eating fish from the Mississippi River near Site R.

Surface Water

Exposure to surface water by incidental ingestion was calculated for teenagers. The exposure calculation assumed that a 55-kilogram teenager ingested 100 milliliters of water during recreation twice per week for 17 weeks out of the year. Based on this exposure scenario, no adverse health effects would be expected from exposure to chemicals in the Mississippi River near the sites.

Surface Soil

Surface soil exposures were estimated for Sites P and Q using their respective chemicals of interest. The exposure scenario for Site P was teenagers ingesting 100 milligrams of surface soil when entering the site 2 days per week, 26 weeks per year. Based on this exposure scenario, no adverse health effects would be expected from exposure to surface soil at Site P.

The two exposure scenarios at Site Q were for a teenager using the southern portion of the site and an adult worker in the northern section of the site. For the teenager exposure scenario we assumed that a 55-kilogram teenager ingests 100 milligrams of surface soil when entering the site 2 days per week, 26 weeks per year. Based on this exposure scenario, no chemicals are expected to cause adverse health effects for the teenage trespassers. Lead was found in one sample in the southern portion of Site Q at a level of 1,920 parts per million (ppm). The next highest level of lead found in this area was 161 ppm. Lead levels greater than 1,000 ppm in residential soils may be a hazard for children six years of age and younger. Exposure to lead at Site Q is not considered a health hazard because trespassers would be older than six years of age, Site Q is not residential soil where exposure would be continuous, and only one of fourteen samples was greater than 1,000 ppm.

For workers contacting surface soil in the northern section of Site Q, we assumed exposure to the average levels detected in the four samples collected by Illinois EPA in 1994. We assumed the workers are exposed to the soil 5 days per week for 50 weeks per year. Based on this exposure scenario, no apparent increased cancer risk would be expected.

Potential Exposure Pathways

Potential exposure pathways (Table 10) could occur during remediation or otherwise by disturbing or contacting surface soil, subsurface soil, and groundwater. Workers remediating site-related contaminants should wear protective clothing.

The nearest drinking water well is upgradient of Area 2, approximately 0.75 miles southeast of Site Q. No drinking water wells are in use near Area 2. The Fox Terminal industrial well is approximately 0.1 miles south of Site Q. Extensive groundwater contamination exists, but no known contact with groundwater occurs near the sites. Groundwater contaminants will not be considered further in this assessment.

Toxicological Evaluation

The estimated exposure doses were compared with health guidelines for non-cancer health effects. An increased risk of non-cancer adverse health effects in children may exist from exposure to MCPP in fish from the Mississippi River near Site R.

2-2 Methyl-4-chlorophenoxy proprionic acid (MCPP)

The level of MCPP found in fish was greater than the USEPA chronic oral reference dose for children. Exceeding the chronic oral reference dose does not mean that adverse health effects will occur. The USEPA chronic oral reference dose for MCPP is based on a study where rats were exposed to levels similar to our estimated dose for MCPP found in the 2000 fish sampling. These rats had increased absolute and relative kidney weights after being exposed to MCPP for 90 days (14). Exposure is based on whole catfish samples and available data suggest a low potential for MCPP to bioaccumulate in fish. The MCPP level in the edible portion of the fish may be much lower. MCPP was not detected in big mouth buffalo fish fillets collected from the same area.

Community Health Concerns

No community health concerns were identified for Sites P, Q, and R. Sauget and Cahokia residents have concerns about other areas in the Sauget Sites. These concerns have been addressed in the public health assessment for Sauget Area 1.

Child Health Initiative

IDPH recognizes that children are especially sensitive to some chemicals. Children's exposure to Area 2 contaminants would be limited to the southern section of Site Q and Mississippi River fish. Children are not expected to be exposed to contaminants at Site R because it is fenced. Site P

is not easily accessible to children because they must cross Illinois Route 3, and the northern portion of Site Q contains active businesses. We estimated exposure for teenage trespassers on the southern portion of Site Q. No chemicals at Site Q are expected to cause adverse health effects or increased cancer risk in the teenage trespassers.

MCPP in fish may increase the risk of non-cancer adverse health effects over a long period for children eating catfish caught near Site R. Available data suggest a low potential for MCPP to bioaccumulate in fish (12). MCPP was detected only in whole channel catfish. The source of MCPP in channel catfish is not known. Parents should follow the proper fish cooking and cleaning guidelines in the Illinois Fishing Information publication from the Department of Natural Resources to reduce exposure to contaminants in fish.

Conclusions

IDPH concludes that Sauget Sites Area 2, Site Q, in Sauget, Illinois, poses no apparent public health hazard. PCB levels in the surface soil at Site Q should not pose a health risk to exposed workers; however, only a limited number of surface soil samples were taken in the northern section of Site Q. MCPP in fish may increase the risk of non-cancer adverse health effects over a long period for children eating catfish caught near Site R. The source of MCPP in the fish is not known.

Sites P and R, within Sauget Sites Area 2, in Sauget, Illinois, pose no apparent public health hazard for exposure to contaminated soil and groundwater. This conclusion is based on the fact that estimated exposure to the highest levels of chemicals detected during environmental sampling would not be expected to cause adverse health effects. Contamination exists in subsurface soil and in groundwater, but no one is exposed to these chemicals.

In the past, before closing and capping of Site R and remediation of surface waste at Site Q, exposure to elevated levels of some contaminants may have occurred. Exposure to site-related chemicals in the past may have included surface water, sediments, exposed waste and drums, and soil, and it is not known if they would have resulted in adverse health effects.

Recommendations and Public Health Action Plan

IDPH recommends that:

1) Children's consumption of channel catfish from the Mississippi River along Sauget Area 2 be limited to twelve fish meals per year. This recommendation corresponds to the fish advisory established for that part of the river by the Illinois Fish Contaminant Monitoring Program.

2) USEPA sample surface soil in the northern portion of Site Q to better characterize the potential for workers to be exposed to PCBs. IDPH will recalculate worker exposure to surface soil when the results of Area 2 samples are available.

Preparers of Report

Preparer
David R. Webb, M.S.
Environmental Toxicologist
Illinois Department of Public Health

Reviewers
Ken Runkle & Jennifer Davis
Environmental Toxicologists
Illinois Department of Public Health

ATSDR Regional Representative
Mark Johnson
Regional Operations
Office of the Assistant Administrator

ATSDR Technical Project Officers
Allen Robison
Division of Health Assessment and Consultation

Sylvia Allen-Lewis
Division of Health Education and Promotion

Steve Inserra
Division of Health Studies

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12) 2001 Illinois Annual Air Quality Report, Illinois EPA - Bureau of Air, Springfield, Illinois. August 2002.

13) Agency for Toxic Substances and Disease Registry. Toxicology Profile for Arsenic. ATSDR. Atlanta, Ga., September 2000.

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Tables

Table 1. Chemicals of Interest in Surface Soil (in parts per million).

Chemical	Site P	Site R	Site Q			Soil Comparison Value (in ppm)	
			Northern	Southern			
				Ponded Area	Railroad		
Benzene	450DJ	–	0.004J	–	–	10	CREG
2-Hexanone	–	–	0.003J	–	–	NV	
4-Methyl-2-pentanone	0.036	–	–	–	–	NV	
Phenanthrene	0.57J	–	0.17J	–	–	NV	
Chrysene	2.2J	–	0.29J	0.78	–	NV	
Benzo(k)fluoranthene	1.9J	–	0.16J	0.59	–	NV	
Benzo(b)fluoranthene	3.9	–	0.41J	0.6	–	NV	
Indeno(1,2,3-cd)pyrene	2.6J	–	–	–	–	NV	
Benzo(a)pyrene	1.6J	–	0.25J	0.54	–	0.1	CREG
Benzo(g,h,i)perylene	2J	–	0.27J	–	–	NV	
Benzo(a)anthracene	1.1J	–	0.41J	0.74	–	NV	
Acrolein	–	100	–	–	–	30	EMEG
4-nitrodiphenylamine	–	0.36	–	–	–	NV	
4-nitrochlorobenzene	–	0.36	–	–	–	NV	
Lead	378	–	218	656	1920	NV	
Thallium	2	–	–	3.81	0.972	NV	
Arsenic	34.7	–	8.3	9.13	6.38	0.5	CREG
Cadmium	32.9	–	13.1	36.8	1.98	10	EMEG
Dieldrin	–	–	0.38P	–	–	0.04	CREG
Endrin ketone	0.052	–	–	–	–	NV	
Aroclor 1254	–	–	–	0.434	311	1	EMEG
Total PCBs[1]	9.8BC	1.31	211BC	0.788	449	0.4	CREG

1 - Total = Aroclors - 1242, 1254, 1260
J - Estimated Value
N - Presumptive evidence of the Chemical present
C - Confirmed
NV - No value
EMEG - Environmental Media Evaluation Guide
Dash - Chemical not detected
D - Analysis at secondary dilution factor
B - Chemical found in blank
P - Analyte present
CREG - Cancer Risk Evaluation Guide

Table 2. Chemicals of Interest in Subsurface Soil (in parts per million).

Chemical	Site P	Site R Remedial Investigation	Site Q				Soil Comparison Values	
			Northern		Southern			
			Remedial Investigation	Samples Before RI	Pre-removal	Post Removal[2]	Value (in ppm)	Source
1,2,4-Trichlorobenzene	–	230	–	13000	–	–	500	RMEG
1,2-Dichloroethene	–	220	–	12	–	–	8	CREG
4-Methyl-2-pentanone	0.049	2800	240J	250	–	–	NV	
4-Nitroaniline	–	8300	–	–	–	–	NV	
Benzene	0.049	210	0.3J	44	–	–	10	CREG
Chlorobenzene	–	2400	4.4J	–	–	–	1000	RMEG
Chrysene	–	–	9	6.4	–	–	NV	
Pentachlorophenol	–	790J	0.24J	100	–	–	50	EMEG
Phenanthrene	–	–	5.3	5.2	–	–	NV	
Toluene	0.41	3800	0.004J	2400	–	–	1000	EMEG
Trichloroethene	–	750	–	55	–	–	2	CREG
2,4-Dichlorophenol	–	16000D	3.3J	3100	–	–	200	RMEG
2-Chlorophenol	–	6900	0.2J	360	–	–	300	RMEG
2-Nitroaniline	–	1000	–	–	–	–	NV	
4-Chloroaniline	–	2000	–	–	–	–	200	RMEG
Benzo(a)anthracene	–	–	5.4	–	270	–	NV	
Benzo(a)pyrene	–	–	3.7J	–	813	–	0.1	CREG
Benzo(b)fluoranthene	–	–	0.15J	1.3	549	–	NV	
Benzo(g,h,i)perylene	–	–	2.7	–	260	–	NV	
Benzo(k)fluoranthene	–	–	3.8J	–	535	–	NV	
bis(2-Ethylhexyl)phthalate	0.23J	960	110DJ	1100	–	–	500	EMEG
Dibenzo(a,h)anthracene	–	–	1.5	–	174	–	NV	
Dibenzofuran	–	–	0.011J	–	–	–	NV	
Dimethylphthalate	–	14J	–	–	–	–	NV	
Indeno(1,2,3-cd)pyrene	–	–	0.31	–	507	–	NV	
Nitrobenzene	–	–	–	56	–	–	30	RMEG
Arsenic	4 R	147	6	–	19.9	–	20	EMEG
Cadmium	4	7	1.2	–	18.9	–	10	EMEG
Lead	526	64.7	16.6	–	2880	–	NV	NV

Chemical	Site P	Site R Remedial Investigation	Site Q				Comparison Value	
			Northern		Southern			
			Remedial Investigation	Samples Prior to RI	Pre-Removal	Post-Removal	Value	Source
Mercury	–	43	0.07	–	–	–	20	RMEG[4]
Vanadium	–	645	28.7	–	–	–	200	EMEG
2,4,6-Trichlorophenol	–	3900	0.027	–	–	–	60	CREG
4,4'-DDT	–	52	–	–	–	–	30	RMEG
Endrin aldehyde	–	290	–	–	–	–	NV	
Endrin ketone	–	99	–	–	–	–	NV	
Heptachlor epoxide	–	0.6	–	–	–	–	0.02	CREG
Aroclor 1254	–	1100	1.7	60	2.05	456	1	EMEG
Total PCBs[1]	–	4800	9	16000	3.15	456	0.4	CREG
TEQ 2,3,7,8-TCDD	–	–	–	0.0033	–	–	5E-05	
2-Chloroaniline	–	4900	4.8	–	–	–	NV	
3-Chloroaniline	–	280	–	–	–	–	200	RMEG[3]

1 - Total = Aroclors - 1242, 1254, 1260
2 - Post-removal subsurface samples analyzed for PCBs only
3 - Comparison value for 4-Chloroanline
4 - Comparison Value for Mercuric Chloride
J = Estimated Value
D = Analysis at secondary dilution factor
N = Presumptive evidence of the Chemical present
TEQ 2,3,7,8-TCDD - Toxicity Equivalance of Dioxins and Furans to 2,3,7,8 - Tetrachloro-p-dibenzodioxin
NV - No value
RMEG - Reference Dose Media Evaluation Guide
EMEG - Environmental Media Evaluation Guide
CREG - Cancer Risk Evaluation Guide

Table 3. Chemicals of Interest in Drums and Surface Waste at Site Q (in parts per million).

Chemical	Central Portion		Southern Portion		Comparison Value	
	Drum Waste IEPA, 1994	Drums, USEPA, 1994	Drums	Waste Pile	Value	Source
Trichloroethene	–	–	17000	0.022J	2	CREG
4-Methyl-2-pentanone	–	–	1800J	–	NV	
1,1-Dichloroethane	–	–	54	–	8	CREG
Phenanthrene	–	–	11J	13	NV	
bis(2-Ethylhexyl)phthalate	–	–	2300	120	500	EMEG
Benzo(a)anthracene	–	–	–	5.8J	NV	
Benzo(a)pyrene	–	–	–	6.9	0.1	CREG
Benzo(k)fluoranthene	–	–	–	5.8J	NV	
Benzo(g,h,i)perylene	–	–	–	2J	NV	
Chrysene	–	–	0.77J	8.2	NV	
Indeno(1,2,3-cd)pyrene	–	–	–	4J	NV	
Benzo(b)fluoranthene	–	–	–	6J	NV	
Total PCBs[1]	51450BC	260000	5042	367	0.4	CREG
Cadmium	–	–	651	65.1	10	EMEG
Arsenic	–	–	138	9.32	0.5	CREG
Chromium	6.5	–	7400	384	200	RMEG (VI)
Toluene	–	–	23000	0.22	1000	EMEG
Lead	25.5	–	18400	764	NV	
Ethylbenzene	–	–	40000	0.028J	3000	RMEG
Xylenes, Total	2.2	–	58000	0.296	10000	EMEG
Naphthalene	–	–	90000B	180B	1000	EMEG
4-Nitrophenol	–	24JD	–	2	NV	
n-Nitrosodi-n-propylamine	–	42JD	–	–	0.1	CREG
4-Chloro-3-methylphenol	–	67JD	–	–	NV	
Dichloroaniline	–	–	–	–	NV	
2-Methylphenol (o-cresol)	–	–	18600	14	3000	
1,3,5-Trimethylbenzene	–	–	14000	0.2J	NV	
n-Propylbenzene	–	–	7100	–	NV	
Aroclor 1254	–	–	4140	267	1	EMEG
n-Butylbenzene	–	–	760J	0.032J	NV	
3,4-Dimethylphenol	–	–	5300	45	NV	
Antimony	–	–	257	–	20	RMEG
s-Butylbenzene	–	–	55J	–	NV	
p-Isopropyltoluene	–	–	580	0.005J	NV	
Benzyl alcohol	–	–	24J	–	NV	
4-Nitroaniline	–	–	19J	–	NV	
Bromodichloromethane	–	–	1	–	NV	
2,4-Dimethylphenol	–	–	21400	34	1000	RMEG
Dibenzo(a,h)anthracene	–	–	–	1.4J	NV	
Dibenzofuran	–	–	–	1.2J	NV	
bis(2-Chloroethyl)ether	–	–	–	14	0.6	CREG
1,2,4-Trimethylbenzene	–	–	40000	0.23	NV	

1 - Total = Aroclors - 242, 1254, 1260
J = Estimated Value
D = Analysis at secondary dilution factor
B = Chemical found in blank
C = Confirmed
NV - No comparison value
CREG - Cancer Risk Evaluation Guide
RMEG - Reference Dose Media Evaluation Guide
EMEG - Environmental Media Evaluation Guide

Table 4. Chemicals of Interest in Sediments in Sauget Area 2 (in parts per million).

Chemical	Site R Sediment[2]	Mississippi River	Soil Comparison Value	
			Value	Source
Chrysene	0.47	–	NV	
Phenanthrene	0.37	–	NV	
Benzo(a)anthracene	0.45	–	NV	
Benzo(a)pyrene	0.49	–	0.1	CREG
Benzo(b)fluoranthene	0.28J	–	NV	
Benzo(g,h,i)perylene	0.16J	–	NV	
Benzo(k)fluoranthene	0.13J	–	NV	
Carbazole	0.032J	–	NV	
Dibenzofuran	0.066	–	NV	
Indeno(1,2,3-cd)pyrene	0.1	–	NV	
Aniline	–	3.4	NV	
Arsenic	9.6	–	0.5	CREG
Lead	22.6	–	NV	
Dichlorprop	–	1.1	NV	
MCPP	–	160	NV	
Total PCBs[1]	1.5	0.12J	0.4	CREG

1- Total = Aroclors - 1242, 1254, 1260
2 - Sediment seeps and surface drainageway
J - Estimated value
NV - No comparison value
CREG - Cancer Risk Evaluation Guide

Table 5. Chemical of Interest in Groundwater in Area 2, Sites Q and R (in parts per billion).

Chemical	Ste Q			Site R - Pre-2000	Site R - Remedial Investigation				Drinking Water Comparison Values	
	Southern Portion	Northern Portion	Northern - RI		Shallow	Intermediate	Deep	Bedrock	Value	Source
1,1-Dichloroethane	1400J	–	31	3J	–	4J	–	–	NV	
1,1-Dichloroethene	–	–	–	7	–	–	–	–	0.06	CREG
1,2-Dichloroethane	–	3000	–	16000	–	16000	300	–	5	MCL
2-Chloroaniline	–	–	220J	–	85000D	140000J	200000J	1600000EJ	40	RMEG1
2-Hexanone	–	3500J	–	–	–	–	–	–	NV	
3-Chloroaniline	–	–	16J	–	4700DJ	500000	1400000	100000J	40	RMEG1
Acetone	–	7100B	–	1700B	–	17000J	420	–	3000	RMEG
Aniline	–	–	41J	–	2600DJ	2400000	92000DJ	23000J	6	CREG
Benzene	–	2000	660	1500	1100	4600J	560	94J	0.6	CREG
Chlorobenzene	–	6700J	130	8100	34000	13000	3400	2000	100	LTHA
Chloroethane	1600J	–	–	–	–	–	–	–	NV	
Chloroform	–	1J	–	–	–	180J	–	–	6	CREG
Ethylbenzene	4700	33J	–	2J	–	410J	410J	87J	700	LTHA
Methylene chloride	5900	2200BJ	–	–	–	270J	–	–	5	CREG
Tetrachloroethene	–	–	–	–	510J	–	57J	–	5	MCL
Toluene	94000	1600J	51	760J	95J	4800	240	580	2000	RMEG
Trichloroethene	–	2J	–	–	0.8J	360J	17J	–	0.09	CREG
Xylenes, Total	32000	230	–	95J	–	560J	960J	300	10000	LTHA
1,2,4-Trichlorobenzene	170J	390	–	–	5J	–	140J	–	10	LTHA
1,2,4-Trimethylbenzene	9300	–	–	–	–	–	–	–	NV	
1,2-Dichlorobenzene	–	2000	9J	340	120J	6500J	220000DJ	2900J	600	LTHA
1,4-Dichlorobenzene	4J	250	13J	550	190J	13000J	1200	–		
2,4-Dichlorophenol	–	14000E	530J	14000E	1500J	25000DJ	5000J	33000J	20	LTHA
2,4-Dimethylphenol	1355	2800	74J	160	–	2400J	–		200	RMEG
2-Chlorophenol	–	33000E	2300J	14000E	640J	26000J	92J	4800J	40	LTHA
2-Methylphenol	–	350	1J	–	–	960	–	–	500	RMEG
2-Nitroaniline	–	2000	–	–	–	–	–	–	NV	
3&4-Methylphenol	–	23000E	–	6100	27J	9800J	–	–	500	RMEG
3,4-Dimethylphenol	1355	–	280J	–	–	–	–	–	NV	
3-Nitroaniline	–	3900	–	–	–	–	–	–	NV	
4-Chloroaniline	–	15000E	19J	25000E	22000DJ	1000000DJ	2300000	160000J	40	RMEG
4-Methyl-2-pentanone	–	2700J	5100	–	–	1900	100	–	NV	
4-Nitrophenol	–	80J	–	–	84J	–	–	–	60	LTHA
Benzyl alcohol	–	490	–	750	–	–	–	–	NV	
bis(2-Ethylhexyl)phthalate	4237	160	220DJ	37	3J	29J	220J	–	3	CREG
cis-1,2-Dichloroethene	2700	–	–	–	–	–	–	–	70	LTHA
Dimethylphthalate	–	–	420DJ	–	–	–	–	–	NV	
Di-n-butylphthalate	58J	12BJ	13J	7J	–	73J	–	–	NV	
Di-n-octylphthalate	–	7J	0.6J	40	–	–	–	–	NV	
Hexachlorobenzene	–	–	–	850	–	–	–	–	0.02	CREG

Chemical	Site Q			Site R - Pre-2000	Site R - Remedial Investigation				Comparison Value	
	Southern Portion	Northern Portion	Northern - RI		Shallow	Intermediate	Deep	Bedrock	Value	Source
Nitrobenzene	–	820	–	420	88J	3600J	8J	5000J	2	RMEG
n-Propylbenzene	1200J	–	–	–	–	–	–	–	NV	
Pentachlorophenol	–	35000E	–	–	–	–	–	–	0.2	CREG
Phenol	192	190000E	13000DJ	60000E	18000DJ	120000DJ	3500J	–	4000	LTHA
p-Isopropyltoluene	580J	–	–	–	–	–	–	–	NV	
2-Methylnaphthalene	860	–	–	200	–	–	–	–	NV	
Naphthalene	9200B	70	–	82J	93J	13000DJ	–	–	100	LTHA
Phenanthrene	20J	–	–	–	–	0.6J	–	–	NV	
Antimony	–	–	72.3	–	–	–	–	–	4	RMEG
Arsenic	430	100	27.7	48	35.6	191	–	29.7	0.02	CREG
Barium	–	384	403	440	431	1800	1550	–	700	RMEG
Beryllium	12	–	–	–	–	–	–	–	4	MCL
Cadmium	57	–	–	20	–	–	–	–	2	EMEG
Chromium (III)	299	13	–	40	–	–	–	–	100	MCL
Cobalt	–	148	–	120	24.1B	–	–	–	100	EMEG
Cyanide, Total	–	1560	–	14	–	–	–	–	200	EMEG
Lead	432	–	–	300	–	–	–	–	NV	
Manganese	–	13200	20400	11200	8040	5870	1880	–	500	RMEG
Nickel	311	74	–	1900	104	–	–	–	100	LTHA
Selenium	61	–	–	–	–	–	–	–	50	EMEG
Thallium	18	–	–	–	–	–	–	–	0.5	LTHA
Zinc	–	326	–	102R	–	3420	1770	–	2000	LTHA
2,4,5-T	3800	–	–	–	–	1.1	19	–	70	LTHA
2,4,6-Trichlorophenol	–	6000	64J	2100	450J	6400DJ	120J	43000J	3	CREG
2,4-D	–	–	–	–	850	22000	1100J	–	70	LTHA
4,4'-DDD	–	–	–	–	–	–	3.4JN	–	0.1	CREG
beta-BHC	–	–	–	–	–	0.057P	–	–	0.02	CREG
delta-BHC	–	–	–	–	–	0.063P	–	–	0.02	CREG
Dichlorprop	–	–	–	–	–	–	–	–	NV	
Dieldrin	–	–	–	–	–	0.17P	–	–	0.002	CREG
Aroclor 1254	133	–	–	–	–	–	–	–	0.2	RMEG
Total PCBs	370	–	–	7.7	–	–	–	–	0.02	CREG

Dash = Chemical not detected

1 - 4-chloroaniline used for comparison
2 - 2-chlorophenol used for comparison
3 - 4-nitrophenol used for comparison
J - Estimated value
D = Analysis at secondary dilution factor
N = Presumptive evidence of the Chemical present
E = Estimated value
B = Chemical found in blank
C = Confirmed

P = Analyte present
NV - No comparison value
RMEG - Reference Dose Media Evaluation Guide
CREG - Cancer Risk Evaluation Guide
LTHA - Lifetime Health Advisory
MCL - Maximum Contaminant Level
EMEG - Environmental Media Evaluation Guide

Table 6. Chemicals of interest in surface water and leachate (in parts per billion).

Chemical	Mississippi River (surface water)	Leachate	Comparison Value	
			Value	Source
Benzene	1.8	–	0.6	CREG
Chlorobenzene	24	1600	100	LTHA
Trichloroethene	0.3	–	0.09	CREG
2,4-Dichlorophenol	31	NA	20	LTHA
4-Chloroaniline	45	–	40	RMEG
Chloroaniline	–	38000	40	RMEG[1]
Chloronitroaniline	–	84	NV	
Chloronitrobenzene	–	21000	NV	
Chlorophenol	–	30000	40	LTHA[2]
Dichloroaniline	–	2800	NV	
Dichloronitrobenzene	–	790	NV	
Dichlorophenol	–	32000	20	LTHA
Di-n-butylphthalate	0.34	–	NV	
Methylbenzene	–	2000	NV	
Methylphenol	–	570	NV	
Nitroaniline	–	100	NV	
Nitrophenol	–	600	60	LTHA[3]
Pentachlorophenol	0.87	–	0.2	CREG
Phenol	–	22000	4000	LTHA
2,4-D	10	17000	70	LTHA
Dichlorprop	1.85	–	NV	
Total PCBs	–	2.6	0.02	CREG
Aniline	–	550	6	CREG

1 - 4-chloroaniline used for comparison
2 - 2-chlorophenol used for comparison
3 - 4-nitrophenol used for comparison
NV - No comparison value
Dash - Chemical not detected
CREG - Cancer Risk Evaluation Guide
LTHA - Lifetime Health Advisory
RMEG - Reference Dose Media Evaluation Guide

Table 7. Chemical of interest in whole catfish.

Chemical of Interest	Estimated Dose	Health Guideline	Source
MCCP	0.0021	0.001	Oral Reference Dose

Child exposure does assumes 16 grams consumed per day, 26 weeks per year, based on a 16 kilogram child.

Table 8. Chemicals of interest in air.

Chemical	Upwind Maximum	Downwind Maximum		Comparison Value	
	ppb	µg/m³	ppb	Value	Source
Benzene	0.312	1.32	0.414	0.1	CREG
Carbon Tetrachloride	–	0.408	0.065	0.07	CREG
Chloroform	–	0.2	0.041	0.04	CREG
Methylene chloride	–	20.42	5.88	3	CREG
Trichlorofluoromethane	–		0.197	NV	
Benzoic acid	2.291		3.5	NV	
Di-n-butylphthalate	0.1		0.1	NV	
Chloro-2/4-nitrobenzene[1]	–		0.005	NV	
2-Methylnaphthalene	0.011		0.019	NV	
1, 2, 4-Trichlorobenzene	–		0.019	NV	
bis(2-Ethylhexyl)phthalate	0.045		0.052	NV	
Diethylphthalate	0.013		0.012	NV	
PCBs	–	0.41		0.01	CREG
Phenanthrene	–		0.07	NV	
Phenol	–	0.04		NV	
Antimony	0.0033		0.003	NV	
Arsenic	0.008	0.0245	0.008	0.0002	CREG
Cadmium	0.03	0.1655	0.036	0.006	CREG
Silver	0.02		0.079	NV	
Thallium	–		0.0034	NV	
Zinc	2.49		2.49	NV	

1 - Lab could not distinguish between chloro-2-nitrobenzene and chloro-4-nitrobenzene
NV - No comparison value
Dash - Chemical not detected
CREG - Cancer Risk Evaluation Guide

Table 9. Completed exposure pathways.

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Number Exposed	Chemicals
Ambient Air	Sites Q and R	Air	Sites Q and R	Inhalation	Employees Workers at or near Sites Q and R	Past Present Future	Breathing	100	Table 8
Surface Water	Mississippi River	Surface Water	Mississippi River	Dermal Ingestion	Recreational Users	Past Present Future	Swimming, skiing, and fishing near Site R	100	Table 6
Fish	Mississippi River	Fish	Fish Meals	Ingestion	Fishermen	Past Present Future	Eating fish from the Mississippi River near Site R	30	Table 7
On-site surface soil	On-site soil Surfacing waste	Soil	Sites Q and P	Ingestion Inhalation Dermal	Workers Trespassers	Past Present Future	Contacting contaminated soil	75	Table 1

Table 10. Potential exposure pathways.

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Potential Number Exposed	Chemicals
On-site Contamination	Area 2	On-site soil Subsurface soil Groundwater Waste	Sites P, Q and R.	Ingestion Inhalation Dermal	Remedial Workers	Future	Surface and subsurface soil and waste excavation or removal Groundwater monitoring or remediation	100	Tables 1 and 2
Industrial Groundwater	Area 2	Groundwater	Fox Terminal Well	Inhalation Ingestion	Workers	Future	Breathing near or ingestion of well water	25	VOCs in Table 3

Figures

Figure 1 - Sauget Area 2 Location Map

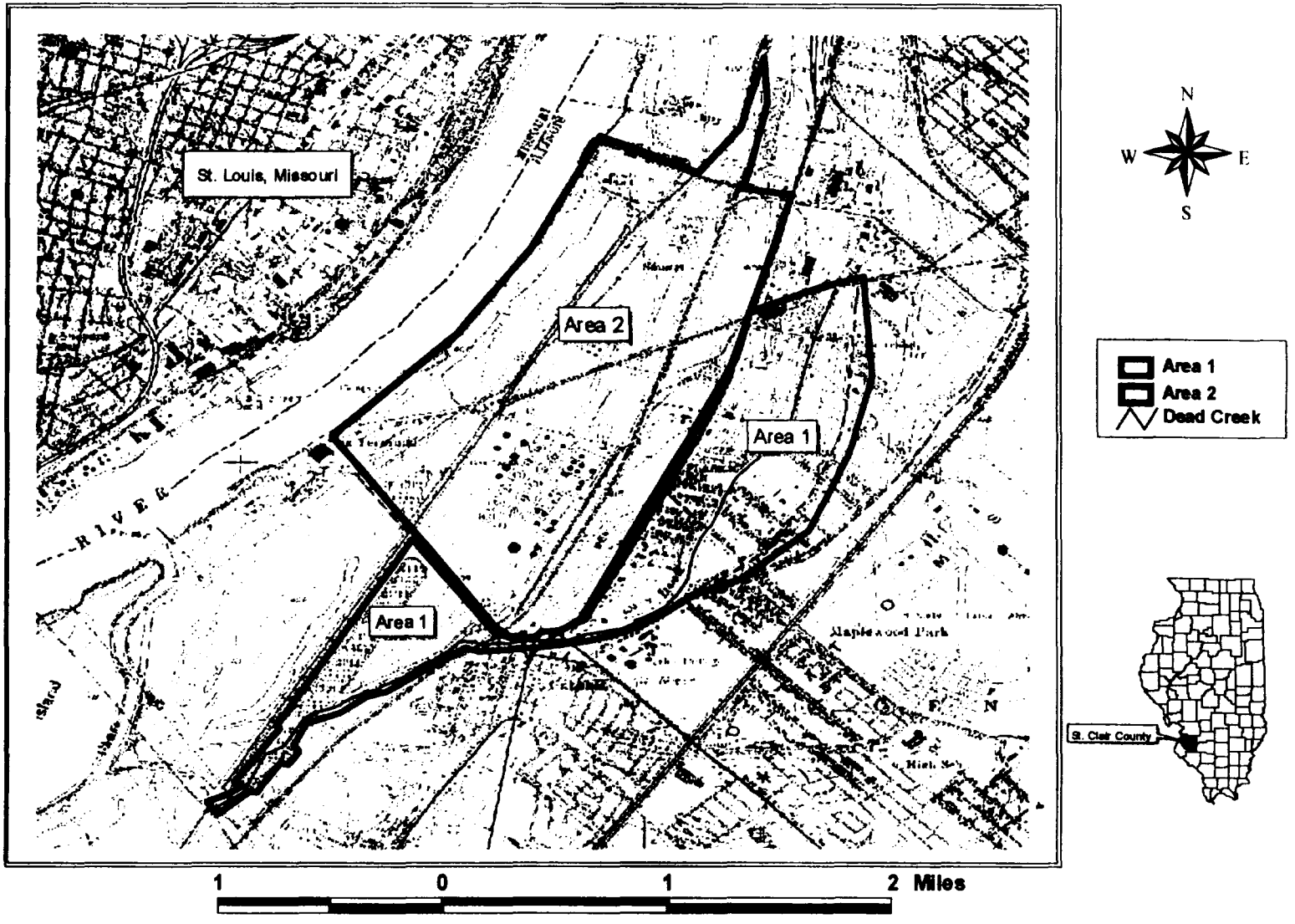


Figure 2 - Area 2 Sites Location Map

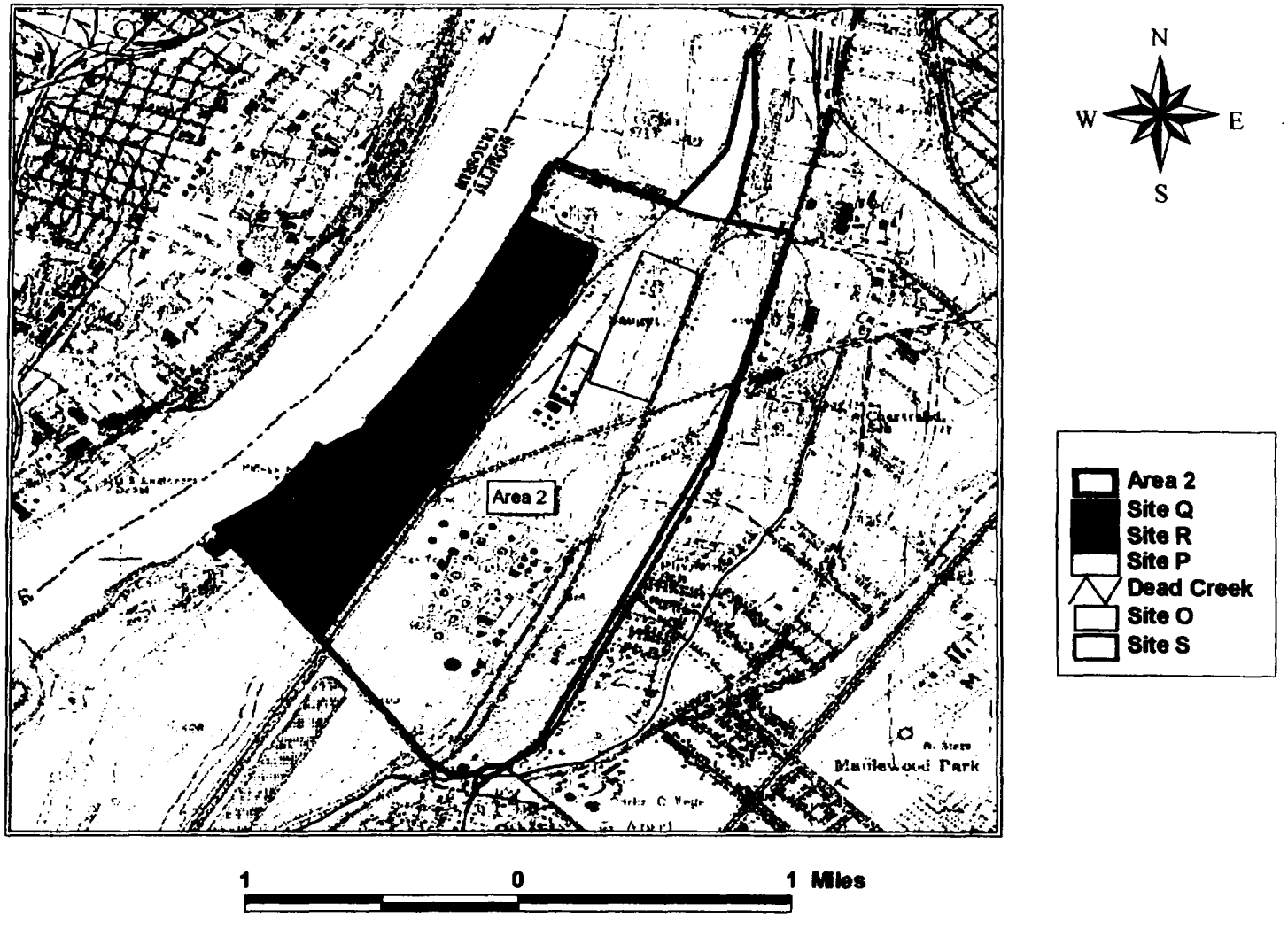


Figure 3 - Site P Sample Locations

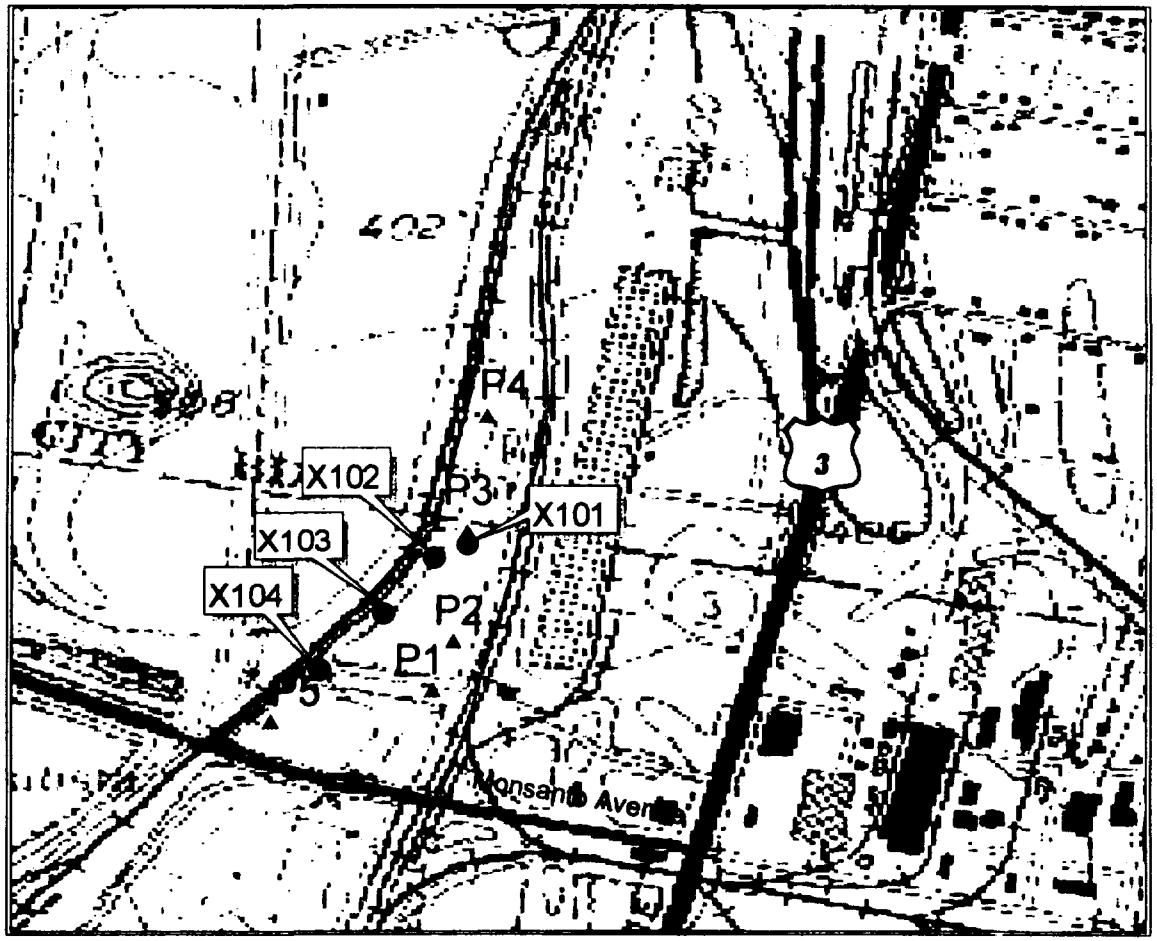


Figure 4- Site Q Surface Soil Sample Locations

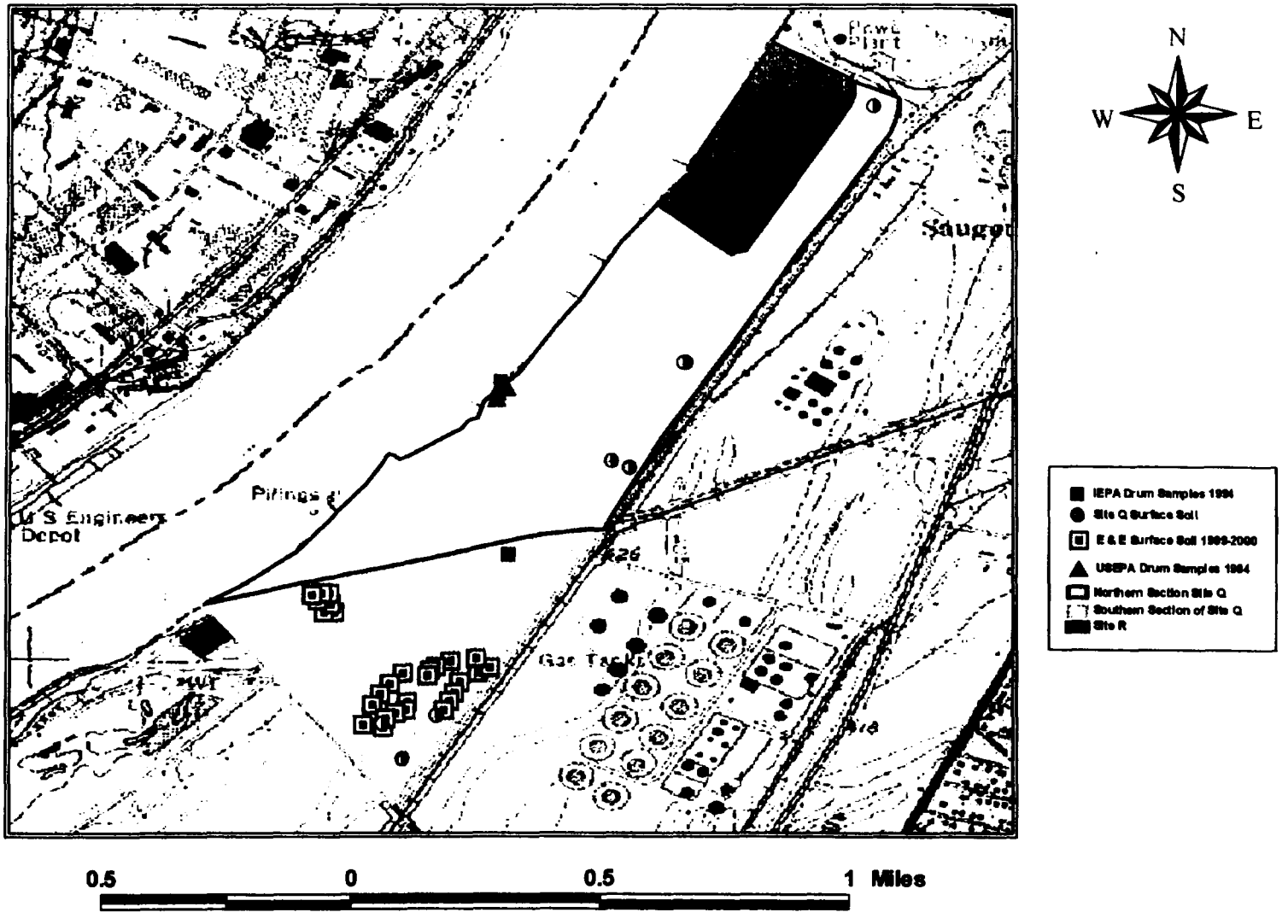


Figure 5 - Air Sample Locations at Sites Q and R

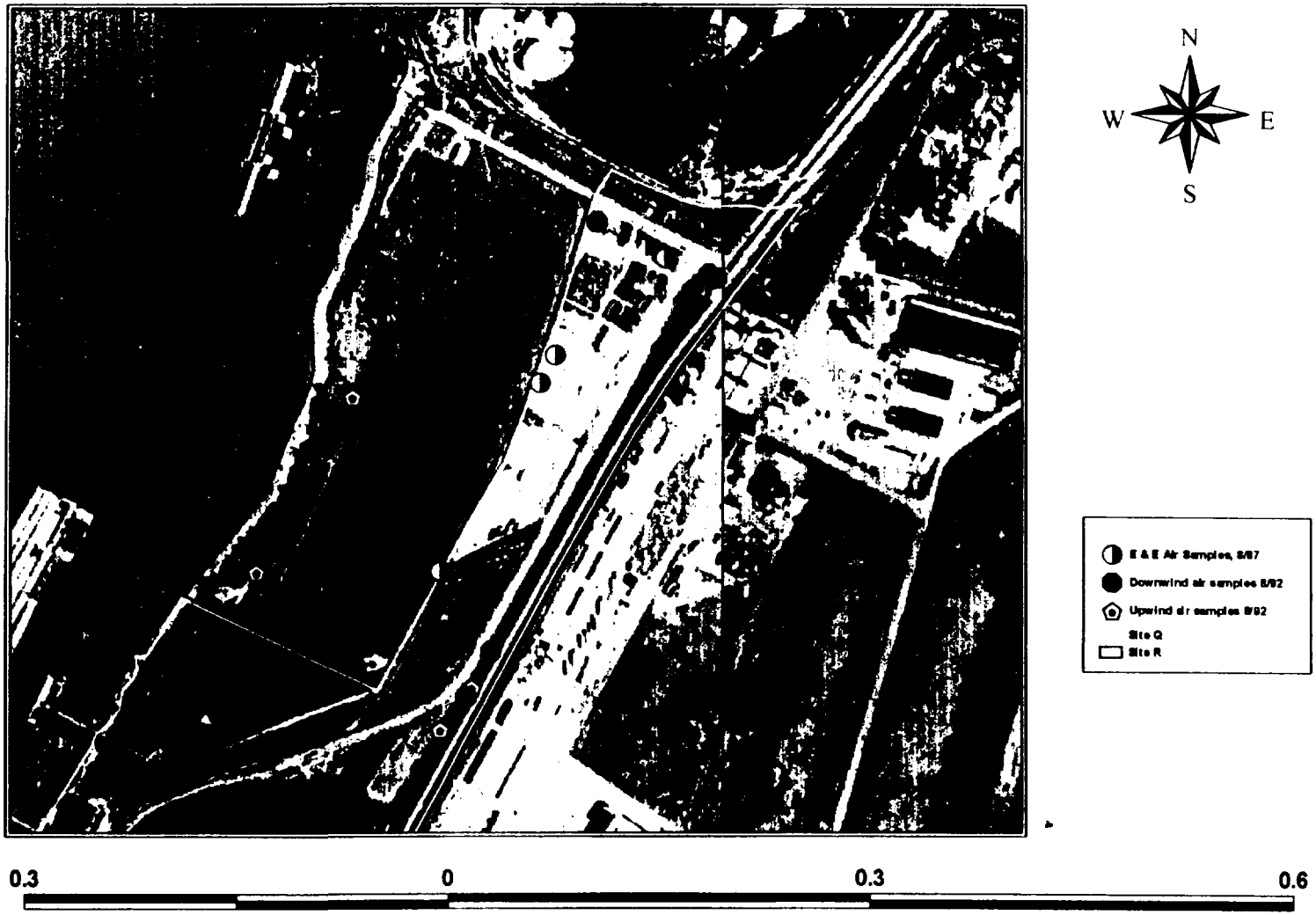
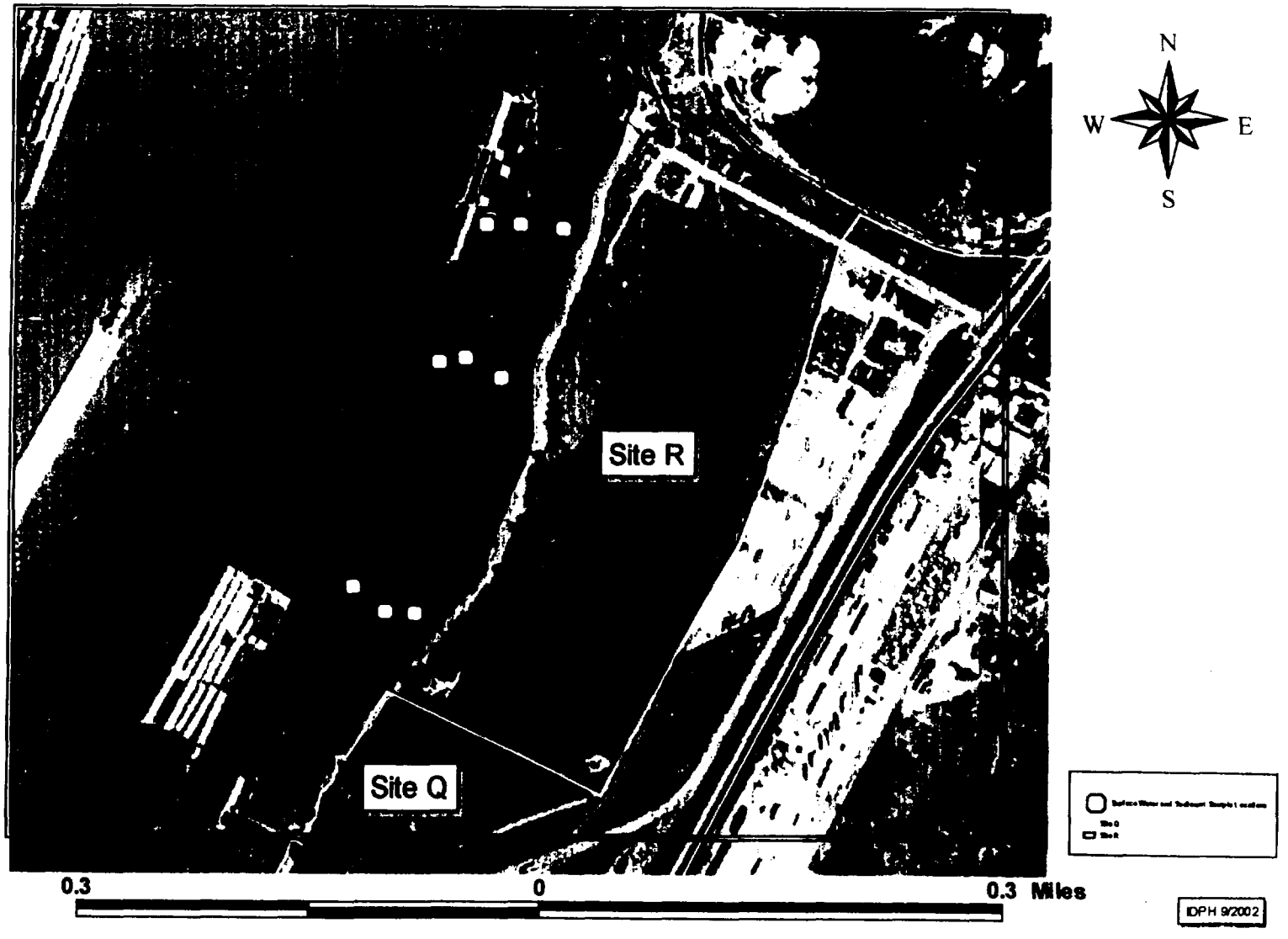


Figure 6 - Surface Water and Sediment Sample Locations



Attachments

Comparison Values Used In Screening Contaminants For Further Evaluation

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National Priority List (NPL) sites, and potential for human exposure. They are derived to protect the most sensitive populations and are not action levels, but rather comparison values. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Reference Dose Media Evaluation Guides (RMEGs) are another type of comparison value derived to protect the most sensitive populations. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Cancer Risk Evaluation Guides (CREGs) are estimated contaminant concentrations based on a probability of one excess cancer in a million persons exposed to a chemical over a lifetime. These are also very conservative values designed to protect sensitive members of the population.

Maximum Contaminant Levels (MCLs) have been established by USEPA for public water supplies to reduce the chances of adverse health effects from contaminated drinking water. These standards are well below levels for which health effects have been observed and take into account the financial feasibility of achieving specific contaminant levels. These are enforceable limits that public water supplies must meet.

Lifetime Health Advisories for drinking water (LTHAs) have been established by USEPA for drinking water and are the concentration of a chemical in drinking water that is not expected to cause any adverse non-carcinogenic effects over a lifetime of exposure These are conservative values that incorporate a margin of safety.